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(54) **METHOD AND APPARATUS FOR
DISTRIBUTING AND DISPLAYING MAPS
ELECTRONICALLY**

(52) **U.S. Cl.** **345/764; 345/835**

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(57) **ABSTRACT**

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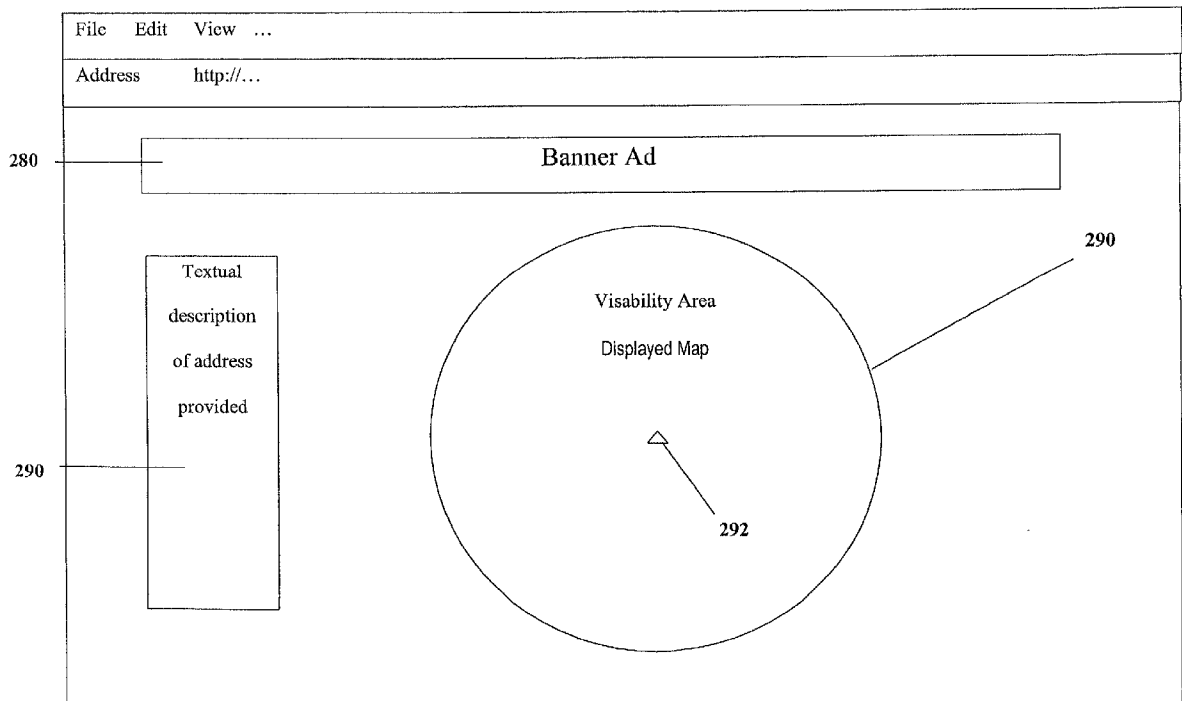
A method and apparatus for distributing and displaying maps is disclosed. The method involves delivery of maps that are not dynamically generated. The area serviced by a map server is divided into fixed zones for which there are static map tiles. When a map is requested by a user, the location of interest is sent to the server by the user via the users client. The server determines which of a plurality of preexisting map tiles contained the location of interest submitted by the client. A central map tile, from this plurality of preexisting maps, containing the location of interest is sent to the client from the map server. The server may also send preexisting map tiles of the zones immediately adjacent to the zone represented in the central map tile.

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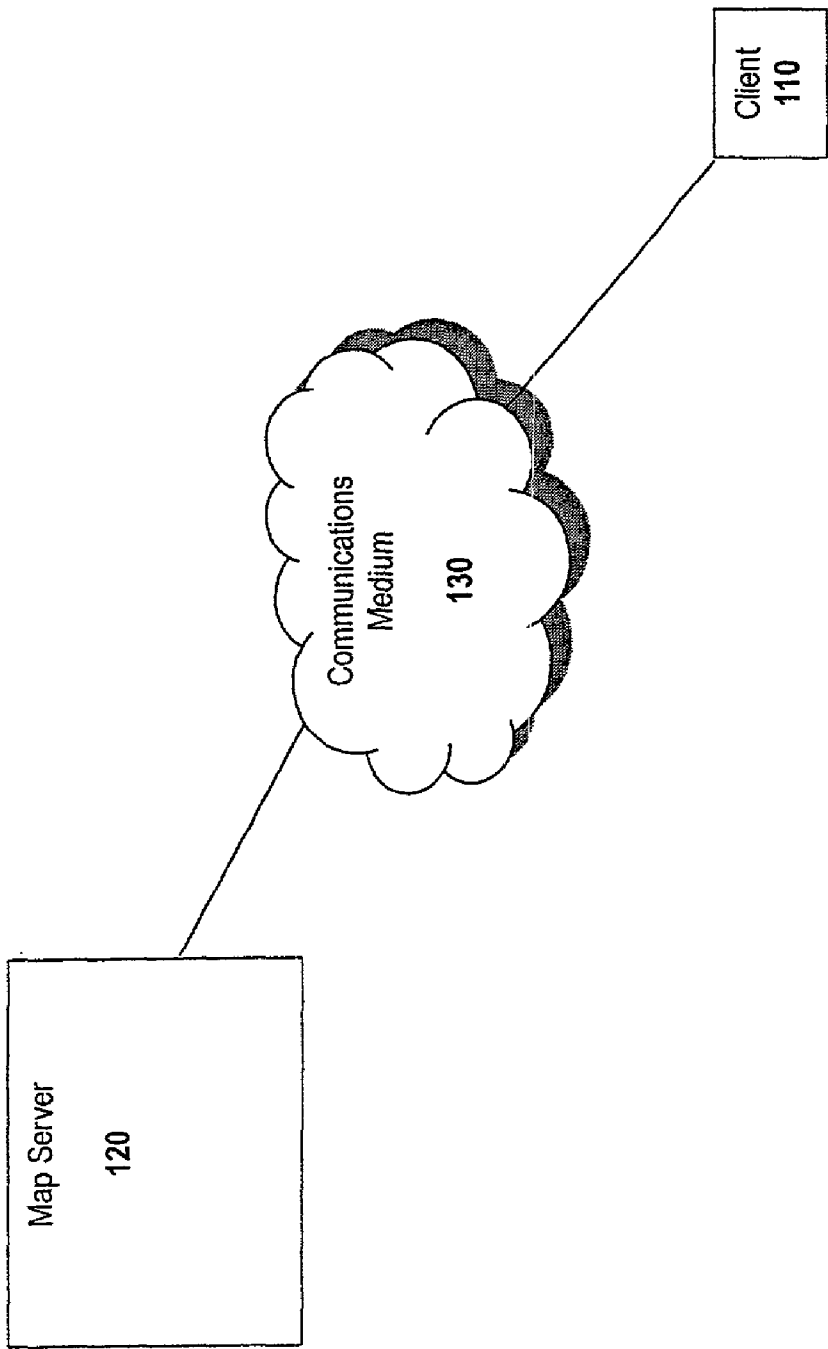


Figure 1

Figure 2A

File

Edit

View ...

Address

http://...

Enter Street Address to Map

Street Address Line 1

Street Address Line 2

City

State

Zip Code

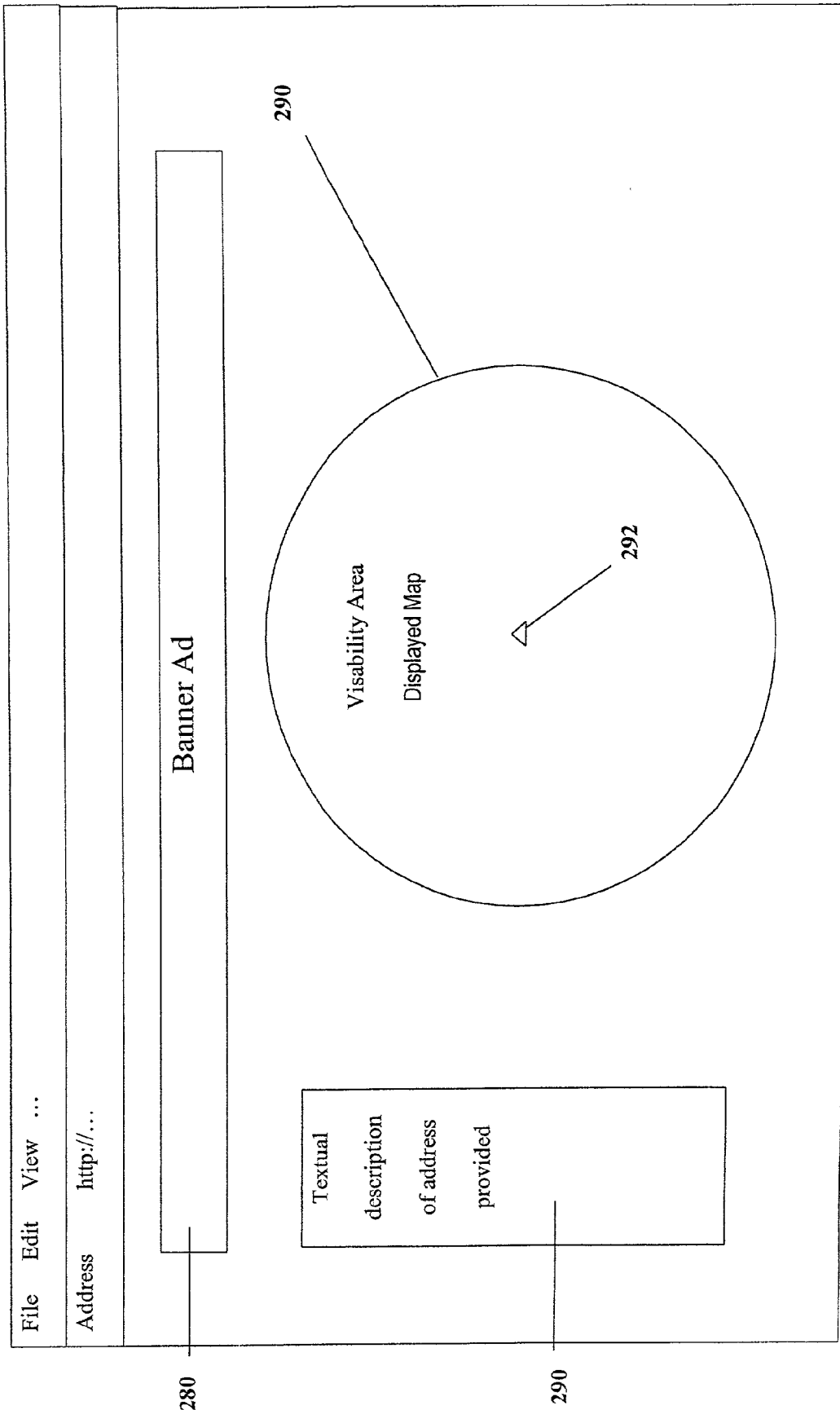
210

Map It!

220

200

Figure 2B



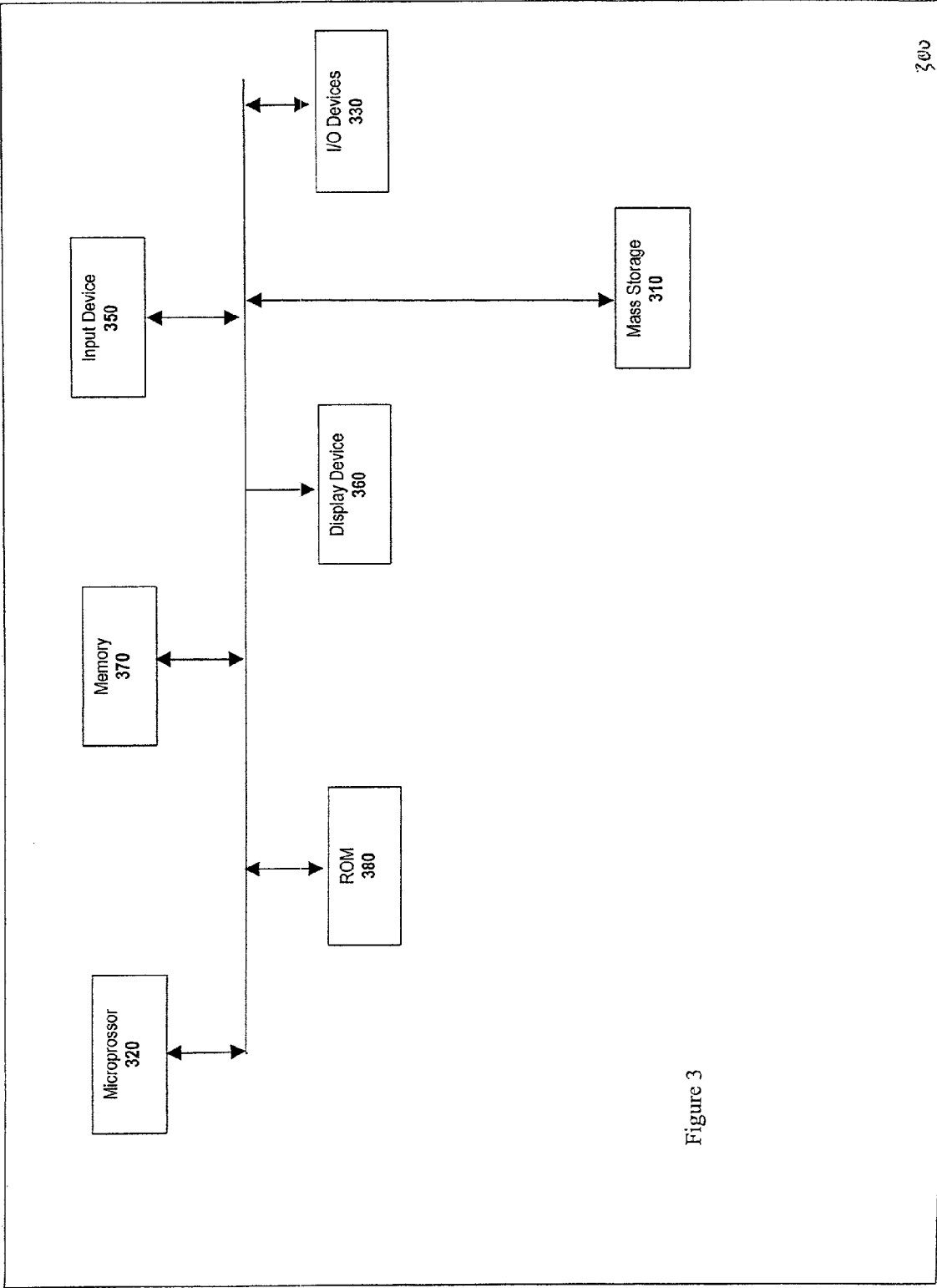


Figure 3

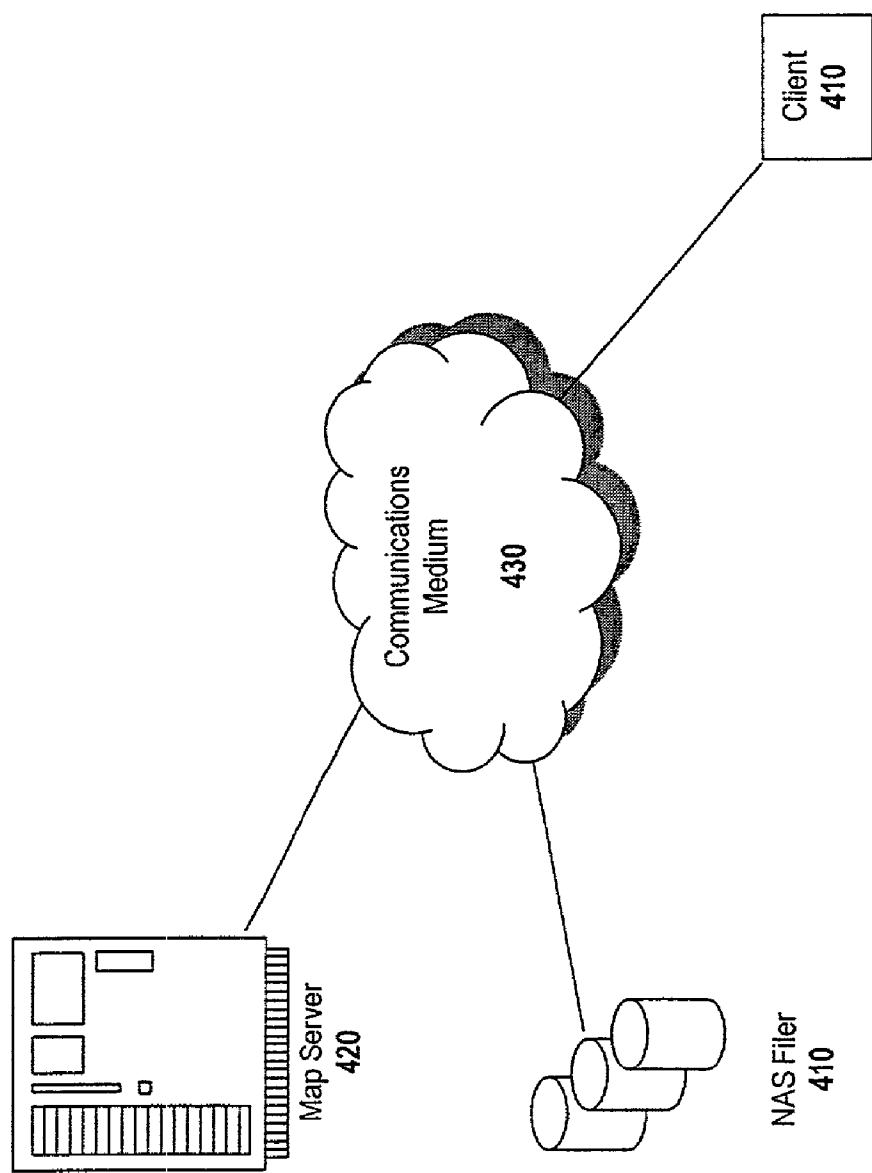


Figure 4

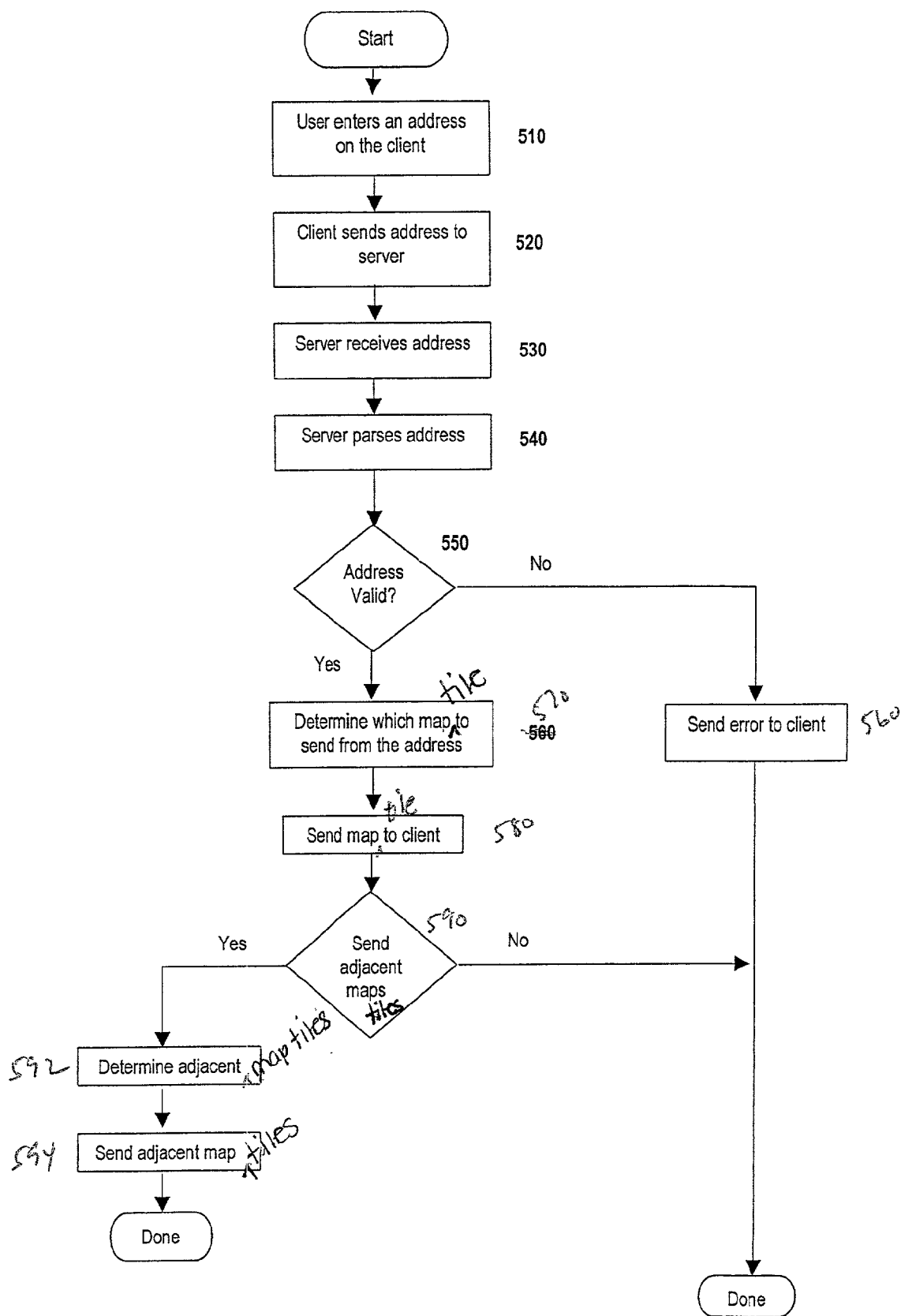
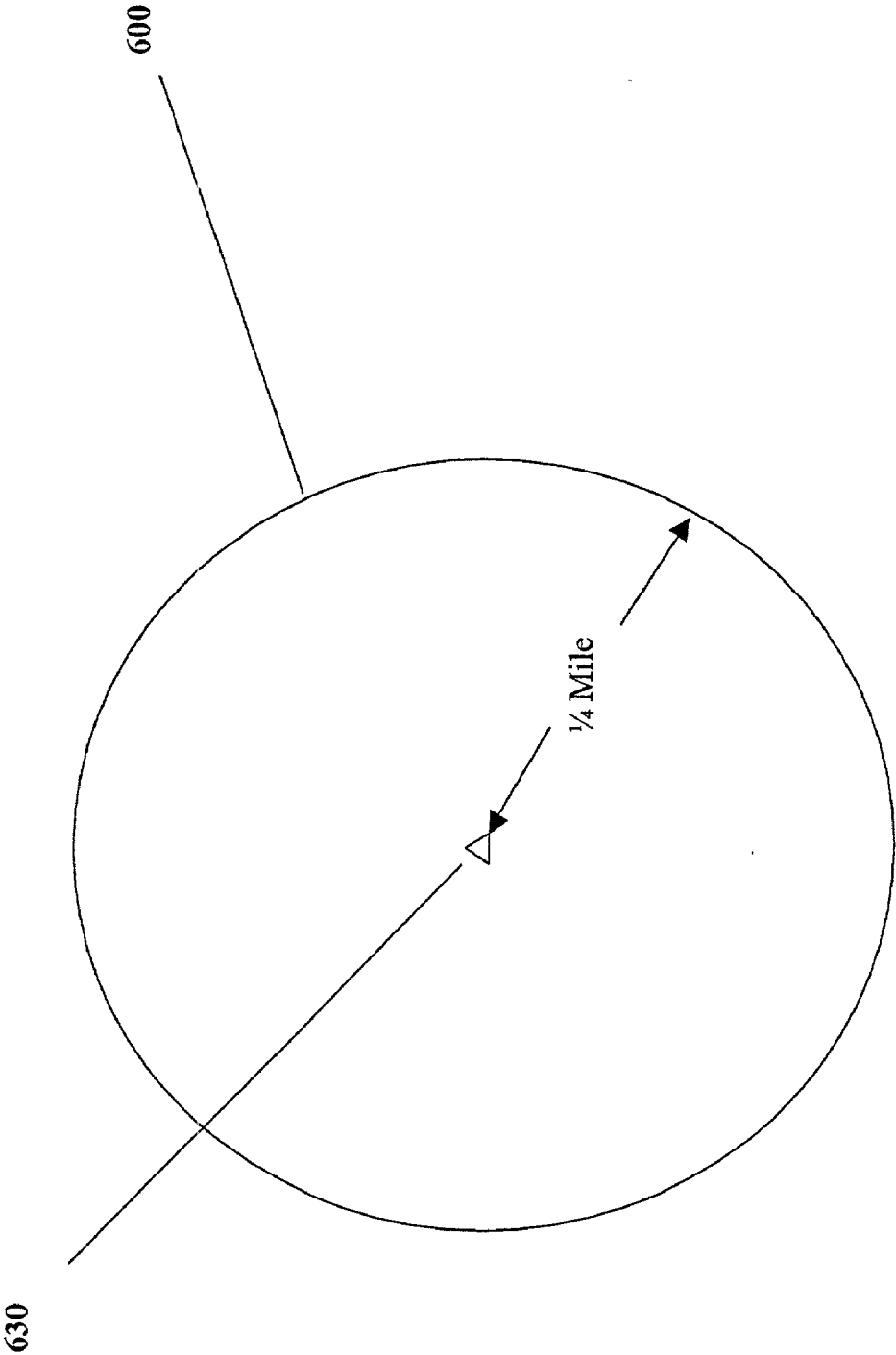


Figure 5

Figure 6



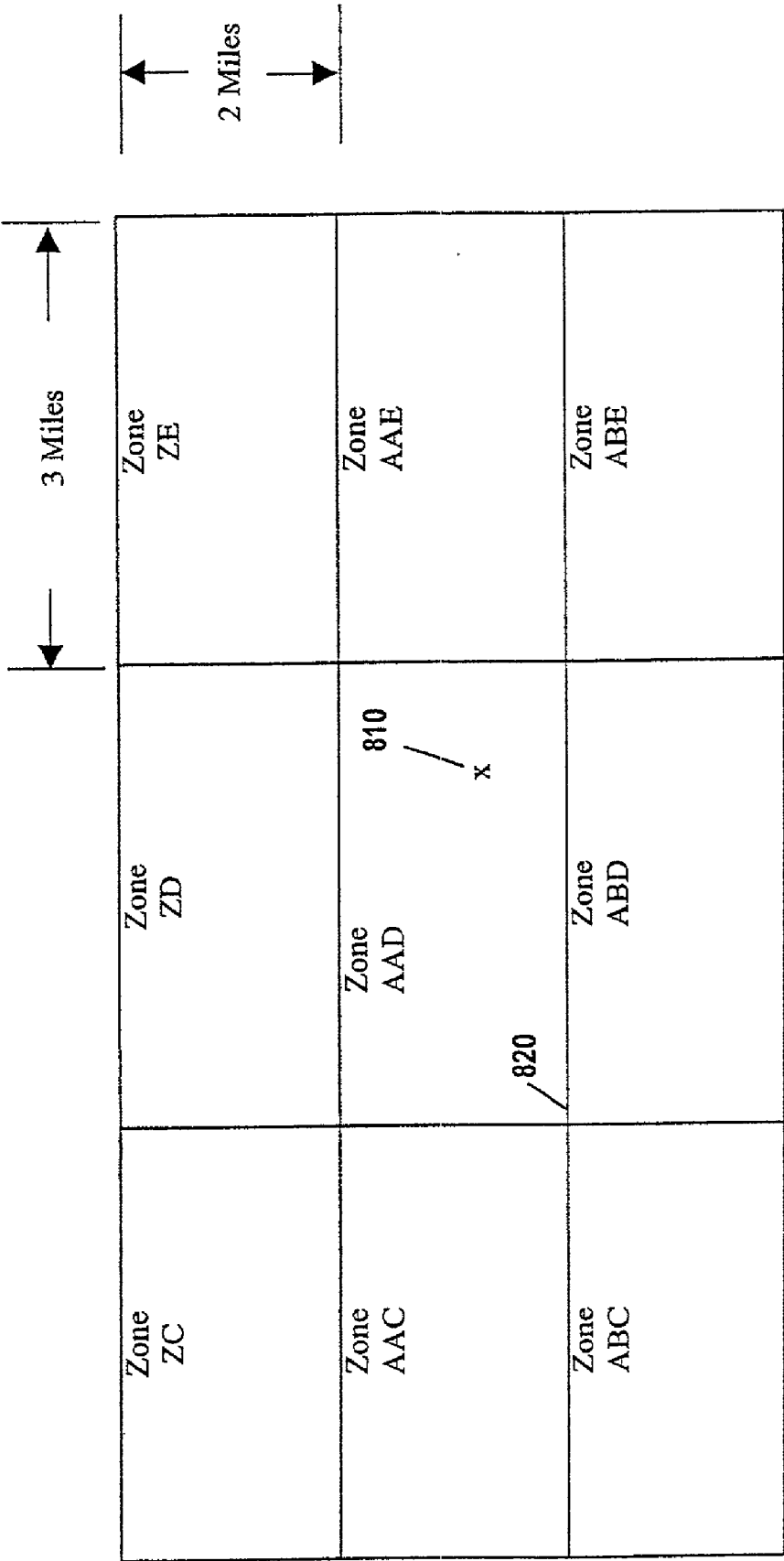


Figure 8

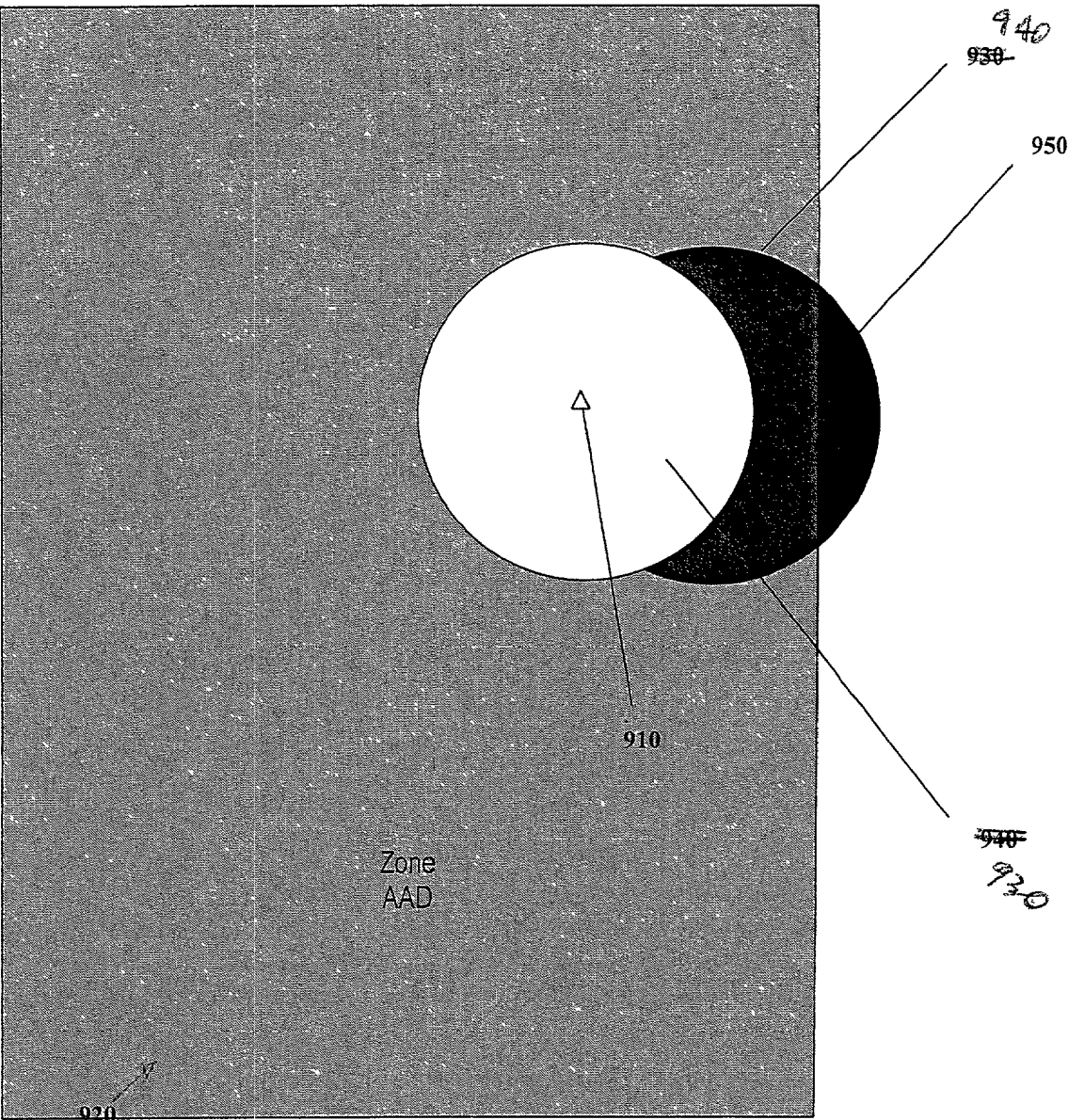


Figure 9

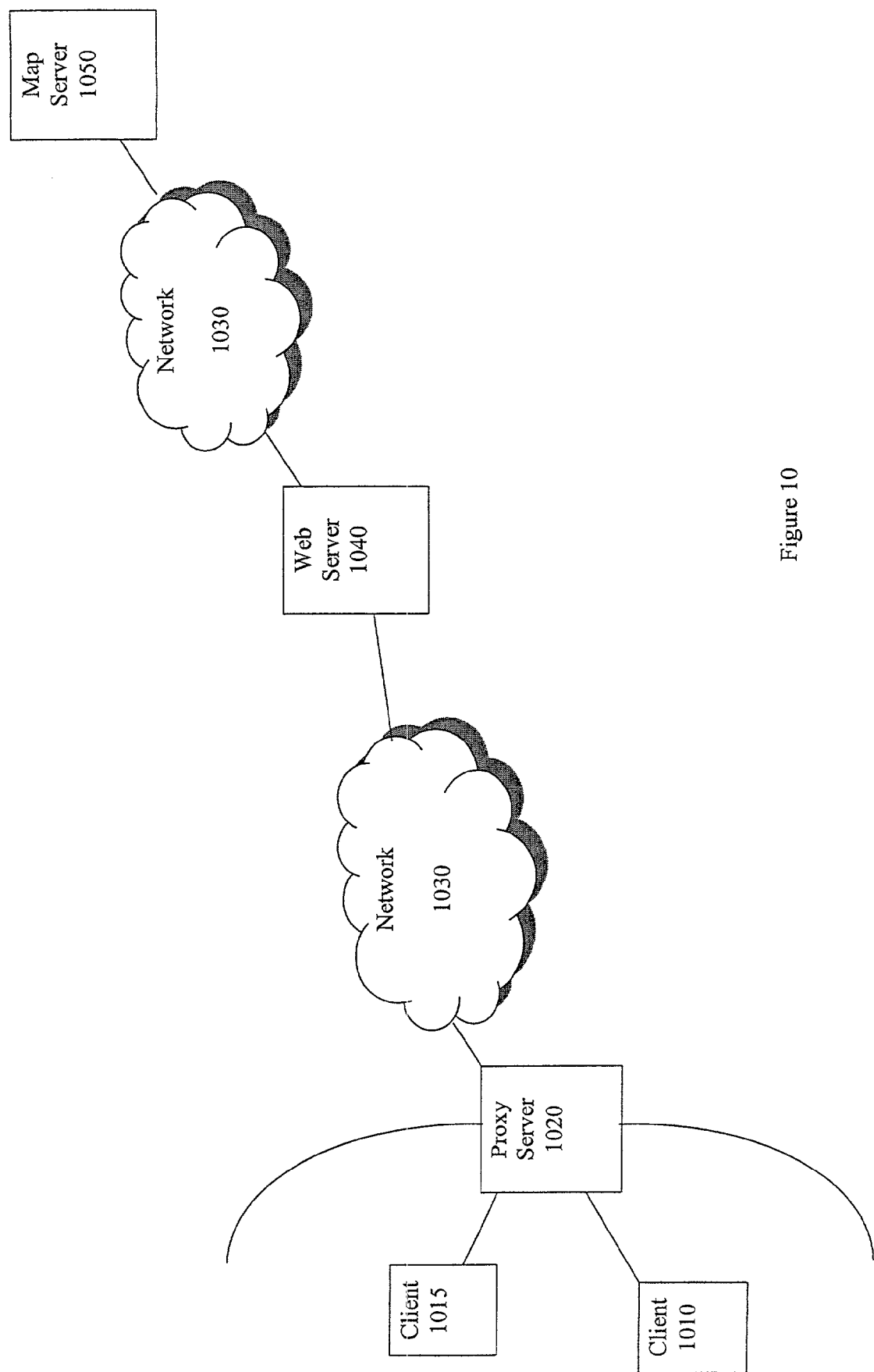


Figure 10

Zone 22750	Zone 22751	Zone 22752	Zone 22753	Zone 22754	Zone 22755	Zone 22756	Zone 22757
Zone 32760	Zone 32761 x ← 1110	Zone 32762	Zone 32763	Zone 32764	Zone 32765 x ← 1115	Zone 32766	Zone 32767
Zone 42770	Zone 42771	Zone 42772	Zone 42773 x ← 1150	Zone 42774	Zone 42775	Zone 42776	Zone 42777
Zone 52780	Zone 52781	Zone 52782	Zone 52783	Zone 52784	Zone 52785	Zone 52786	Zone 52787
Zone 62790	Zone 62791	Zone 62792	Zone 62793	Zone 62794	Zone 62795	Zone 62796	Zone 62797

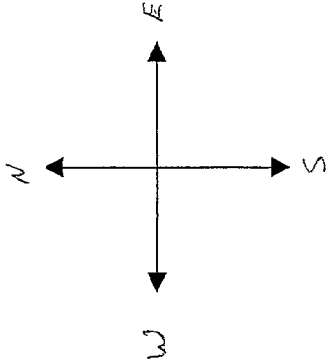


Figure 11

METHOD AND APPARATUS FOR DISTRIBUTING AND DISPLAYING MAPS ELECTRONICALLY

BACKGROUND OF THE INVENTION

[0001] 1. Field of the Invention

[0002] The present invention relates to the field of information processing. More specifically the present invention relates to the electronic distribution and display of maps.

[0003] 2. Background Information

[0004] People at times are presented with an identifier of an unfamiliar location. For example, when looking up an auto repair business in the phone book, the user will have available to them the address of the repair shop. Assuming the person is unaware of the location of the shop, the person would desire to have some help in determining how to navigate to the shop. In general, people would like to have a graphical representation of the location with respect to its surroundings, e.g. a map. Frequently, with the ever-increasing capability and connectivity of the Personal Computer (PC), the location of interest is provided, in some manner, via the PC. Examples of how the locations of interest are provided via the PC include; email from a friend containing the address of a social event, a website containing the address of the local salesroom for a company, and the longitude and latitude of a popular hiking destination via a popular outdoor magazine website.

[0005] There are currently several websites that offer the capability for a user to obtain a graphical representation, i.e. a map, of a street address. In response to providing the address, the user will be provided a map that shows the area surrounding the provided street address. On this provided map, the user will be able to perform various operations. One of these operations is zooming in and out on a map. Zooming is the ability to see more or less of an area surrounding the requested location. This usually happens at the expense of resolution since one is looking at a greater area in the same amount of view space. Another ability is the ability to "pan" in any direction that the user chooses. In other words, to have the map stay at a given level of resolution but have the map "move" the area covered by the current view space in a particular direction.

[0006] The most notable deficiency with the current map serving products is that the time required to have a map provided to a user can be lengthy. This is because of the method by which the current map servers provide the maps. First, the address is provided to the server by the user from the client machine. Second, the server will generate, in real time, a map containing the address provided to the server from the client. Finally, when the generation of the map on the server is complete, the map image is sent to the client from the server. Each subsequently required map, i.e. as a result of the user zooming or panning, is also generated and delivered in this real-time manner. The use of one of these prior art products demonstrates the negative effects associated with the dynamic generating of these maps. These negative effects are the major motivations for the present invention. The reason that dynamically generating a map is an issue is two-fold. First, the processing power required to generate real-time graphics is extensive. Second, the use of real-time graphics for each map implies generation of a new map with every request associated with an existing map.

[0007] Since the prior art process involves the real-time generation of the graphical images, the server will be spending time generating these images real-time. Map generation on the server is a relatively time consuming process and can make the overall processing time of getting the map to the user quite lengthy. This is especially true as the connection speeds with which most users access the Internet increases. As the user access speed increases, the time that it takes to transfer the bit map to the user become less of a factor thus making the map generation delay even more noticeable.

[0008] There is another consequence of the real time generation of graphical images. As previously mentioned it requires processing power to produce real time graphical images. To provide the ability to service many clients with real-time maps would require significant processing power. Therefore a site wishing to provide maps to a large number of clients will need to either have access to a great deal of processing horsepower or have a large delay for users while the requests for maps are queued. Neither requiring the server owner to provide more processing power nor having a large delay for users waiting for maps is a desirable trade-off.

[0009] The second reason that dynamically generated maps are an issue is that every map is custom. Specifically the deficiency has to do with the inability to manipulate a map once it has been provided to the client. Frequently, the user may want to see a different area relative to the location of interest (e.g. to pan or move the current display). The current solutions current solutions always contact the server. The server generates another map in real-time and this map is sent to the requesting user. This generation of a new map every time that a user requests a new view is frustrating to the user.

[0010] Thus a more effective approach in providing and delivering maps to the user is desired.

SUMMARY OF THE INVENTION

[0011] The present invention provides a method and apparatus for distributing and displaying maps to a client. As client provides an identifier of a requested location to a map server. The map server has available to it a plurality of preexisting map tiles collectively covering the area supported by the particular map server. For example, if a map server is to provide information about the area covered by a particular country, it is pre-provisioned with the map tiles that cover the country. The supported area will be divided into a plurality of zones. Each zone will be represented by one map tile. The server will determine which map tile in the plurality of preexisting map tiles contains a representation of the requested location. The server will send at least this map tile to the client.

[0012] In an embodiment of the present invention, the location requested is provided in the form of a street address. In an alternative embodiment, the location is requested in the form of longitude and latitude. For either case, the server will send, in addition to the map tile, an indication of, or the logic to generate such indication, where on the map the location of the requested street address or the longitude and latitude would reside. The client will then add a marking on the map, prior to displaying it to the user, which indicates the location on the map of the requested longitude and latitude.

The indicator is rendered by the client along with the “visible portion” of the map tiles.

[0013] When a supported area is divided into zones, as in the case with the present invention, there will, in most cases, be zones that are immediately adjacent to the central zone. The central zone is the zone which contains the requested location. In an embodiment of the present invention, a set of preexisting map tiles of the zones immediately adjacent to the central zone will also be sent to the client. The combination of all of the zones immediately adjacent to the central zone combined with the central zone itself will be termed the first inner area. In another embodiment of the current invention, a second set of preexisting map tiles representing the zones immediately adjacent to the first inner area are sent to the client in addition to the first set of preexisting maps. The combination of the first inner area with the zones immediately adjacent to the first inner area will be termed the second inner area.

BRIEF DESCRIPTION OF THE DRAWINGS

[0014] FIG. 1—Block diagram of an embodiment of the invention.

[0015] FIG. 2A—One embodiment of the client interface for location input in the present invention.

[0016] FIG. 2B—Display of one embodiment of the client interface for the present invention including rendering visible area of map tiles.

[0017] FIG. 3—Typical embodiment of server architecture

[0018] FIG. 4—Embodiment of invention with a Network Attached Storage filer.

[0019] FIG. 5—Flowchart for one embodiment of the present invention method.

[0020] FIGS. 6 and 7—Embodiment showing a requested location near the meeting of two zones.

[0021] FIG. 8—Embodiment showing zones immediately adjacent to the central zone.

[0022] FIG. 9—Embodiment showing requested location near the edge of a zone and the effect of panning east.

[0023] FIG. 10—A network architecture with an embodiment of the present invention.

[0024] FIG. 11—A map showing the zonal division of an embodiment of the present invention.

DETAILED DESCRIPTION OF THE INVENTION

[0025] The present invention is a method and apparatus for distributing and displaying maps in an electronic system. The detailed description herein is intended to provide a person skilled in the art with the required information to practice map distribution and displaying via this improved method. The invention disclosed is not intended to be limited to the embodiments discussed herein. Rather the embodiments are mere example implementations of the invention described. Those skilled in the art will understand that the embodiments shown can be modified to produce other embodiments by applying the principles herein

described. The document is to be interpreted in the broadest scope possible keeping within the spirit of this invention.

[0026] High-level System

[0027] FIG. 1 shows a block diagram of an embodiment of the system of the present invention. In this embodiment, there exists a client **110** that will send an identifier of a requested location in an area supported by a map server, via a communications medium **130**, to a server **120** incorporated with the tile based map delivery invention of the present invention. The server **120** will advantageously provide the client with a map of an area comprising the location provided to the server, in accordance with the present invention.

[0028] The communications medium **130** can be wired or wireless. The communications protocol employed thereon may be any one of a number of communications protocols known in the art, e.g. TCP/IP. In an embodiment of the present invention, the map server may be connected to the client via the Internet. For example, the client may be a user of a Personal Computer (PC) with the address of a local post office who accesses an Internet based map server to look up the location of the post office using a dial-up connection to his/her Internet Service Provider (ISP). In another embodiment, the client may be connected to the server wirelessly via a wireless connection. For example, a user who is servicing factory equipment may have a Personal Digital Assistant (PDA) with a wireless network adapter. The user may have the grid coordinates of a faulty machine. The user can submit the grid coordinates of the faulty machine, via a wireless connection, and the map server will serve up a map showing the location of the faulty machine.

[0029] The area serviced by the map server may be any area capable of being represented by a map. Most applications in this area are focused on geographic areas, however the current invention is not limited to this usage. As shown in the example above, the area covered by the service of a map server may be the layout of an industrial complex or a factory building.

[0030] The identifier of a requested location may be any indicator of a particular location in the area of service covered by the map server. For example, if the area serviced by a map server is a geographic area bounded in a state, the user may be able to provide a street address as an identifier. Another method of providing an indicator of a particular location is through a longitude/latitude pair. As another example, in the case of an area of a campus or an indoor facility, the location may be a grid location as defined in the plans for the campus or indoor facility.

[0031] Client Side

[0032] As shown in one embodiment of a client in the present invention, in FIG. 2A, the client is a generic user agent, such as a web browser, running on a Personal Computer (PC). After loading a page that provides fields for inputting a street address **210**, the user types in the street address as the identifier of a requested location. When the user instructs the client to do so **220**, the client will send to the server the identifier of the requested location, in this case a street address. The client will then wait for the map server to send the appropriate map tiles and rendering instructions to the client. As shown in FIG. 2B, when the map tiles and rendering instructions have been returned to the client, the client will then display a map of an area comprising the

requested location **292** on the user display area **290** using the received map tile and rendering instructions. In one embodiment, the map will be sent along with an indicator, or the logic to generate the indicator, indicating the location of the street address on the map **292**.

[0033] The client may be any electronic device capable of performing the following; connecting to a map server via a communications medium, using a known communications protocol, sending an identifier of a location, receiving back the map tiles from the map server and displaying the visible area of the map tiles to the user. Examples of this type of client include a Personal Computer (PC), a Personal Digital Assistant (PDA), a mobile phone, and a transceiver with graphic display in a motor vehicle.

[0034] Server Side

[0035] **FIG. 3** shows an embodiment of a server device for the present invention. The server is implemented on a computer system. Computer systems are well known to those skilled in the art and will not be discussed in significant detail. Several items of the computer system are of special interest to the present invention and will be addressed as needed.

[0036] Note that the computer system of **FIG. 3** contains mass storage **310**. In this embodiment, the map images are stored on this mass storage device. If the map server is tasked with serving a large geographic area with detail, the amount of storage is scaled to provide the necessary storage. Alternative embodiments of the current invention can provide a reasonable response time without the need for more expensive hardware. **FIG. 4** shows an alternative embodiment of two map servers on a network with a Networked Attached Storage (NAS) filer **410**. In this embodiment, map server **420** handles the request from the client **430**. The map tiles are stored on NAS **410** and selectively provided to the client. This provides at least one advantage, as the NAS is a dedicated, high-performance, high-speed communicating single purpose machine, it can be shared between map servers thereby reducing the need for additional storage at each server. Further, they can off-load the file server requirements from the map server thus providing the map server with the ability to handle more clients.

[0037] **FIG. 5** shows a flowchart that describes the behavior of an embodiment of the present invention. This embodiment consists of a system that utilizes the client of **FIGS. 2A and 2B**, with an address in the United States, and the server of **FIG. 3**. In step **510**, the user enters an identifier of a requested location, here a street address **210**, into the client browser **200**. After the user clicks on a button **220** instructing the client browser **200** to send the address to the server **300**, the client sends the address to the server **520**. The server **300** receives the address **530** and parses the address **540**. The server **300** checks to see if the address is of a valid format and if the address is contained within the area supported by the database of the server **550**. If the address meets both of these requirements, it is accepted and further processed. Otherwise, an error is sent back to the client **560** indicating either "improper address format" error message or an "area not supported" error message.

[0038] Central Map Tile

[0039] The supported area may be a single contiguous area or multiple, non-contiguous areas. For example, the sup-

ported area may cover the entire surface land area of the earth, a single country, an area of several states or a neighborhood in a metropolitan area. As mentioned above, the invention may also cover several non-contiguous areas. For example, a provider of this service may decide to provide support to both the east and west coast areas of the United States but not the inlands area. The invention may also be used at the level of a company wherein a corporate campus may be the area. Similarly, the area may be limited to the interior of a building.

[0040] In accordance with the present invention, the areas supported are divided into smaller areas called zones. Each zone can have one map tile corresponding to it. A map tile is therefore a representation of a zone. Any representation of a portion of the area supported by the server can be represented by combining multiple map tiles. The zone containing the requested location is the central zone and the corresponding map unit that represents this zone is the central map unit.

[0041] For each zone there will need to be an indication of which set of locations is to be covered by each zone. For example, in the case of longitude and latitude with rectangular zones divided by a minimum and maximum latitude and longitude, this minimum and maximum information would need to be associated with each zone.

[0042] As mentioned previously, **FIG. 5** shows the flowchart for an embodiment of the present invention wherein the area covered is that of the United States. If the address is accepted **550** as described above, the next step is for the map server **300** to determine which map tile represents the zone in which the requested location is contained **570**. In the embodiment described in **FIG. 5**, each zone is determined by a zip code. Therefore, the zip code from the address is used to determine which map tile of the plurality of pre-existing map tiles is to be sent to the client **580** as the central map tile. In this embodiment, no adjacent map tiles are to be sent (adjacent map tiles will be discussed subsequently). As a result, the query for adjacent map tiles step **590** in **FIG. 5** is answered in the negative and the process is complete.

[0043] In the current embodiment, each map tile is contained in a single file. Note that this is not a requirement of the current invention. A file may contain multiple map tiles, or a map tile may be divided among multiple files. At least the file containing the map tile is sent to the client **580**. Note that since the user has the map tile for the entire central zone, any panning around the location, while staying in the central zone, can be updated by the client immediately. This is a significant advantage over the prior art. When the user requested another map in the prior art, for example, a new bit map from the server was required.

[0044] As mentioned already, each supported area is divided into zones. Each zone corresponds to a map tile. There are times when a single map tile is not sufficient or desirable. **FIGS. 6 and 7** shows an example of such a situation. **FIG. 6** shows the location **630** to be requested by the client. The requested location is shown in a circular region **600** that shows the default display region for the client, e.g. the visibility area, upon receipt of the map tiles from the map server. **FIG. 7** shows the position of the requested location in relation to the zones representing existing map tiles. Zone **946** represents the central zone for the requested location. Note the proximity of the requested

location to the immediately adjacent zone **947**. In this embodiment of the invention, the client is to have a visibility area of $\frac{1}{4}$ mile in radius **600** surrounding the requested location **630**. The distance from the requested location to the edge of the central map tile containing the requested location is 750 ft **640**. This distance is less than that required for the visibility area of the client. As a result, in this example, two corresponding map tiles representing the two corresponding zones will need to be sent to the client, map tiles for zones **946** and **947**.

[0045] In one embodiment of the current invention, when the central map tile is sent to the client, additional information comprising the identification of the zones immediately adjacent to the central zone is also sent to the client. Zones immediately adjacent to a given zone are those zones that share a common boundary with the given zone. For example, the URL of the map tiles that correspond to the immediately adjacent zones will be sent to the client. When additional map data is required, as mentioned previously with respect to the panning operation, the client determines, based on the area where the required data is needed and the identifiers of the immediately adjacent maps, which additional zones are required and it requests these map tiles from the server. This process will be discussed in further detail in subsequent text.

[0046] In another embodiment of the present invention, the naming convention of the zones implicitly provides identification of the zones, and consequently the URL of the corresponding tiles, immediately adjacent to a given zone. For example, referring again to **FIG. 7**, if the central zone is zone number **946**, and we are interested in retrieving the zone immediately to the east (right) of the zone, we know via a naming convention (e.g. that maps are numbered sequentially in ascending order, moving to the east) that the zone being requested is zone **947**. In this embodiment, the URL for this map tile will be determinable from the zone identifier. In another embodiment, the naming convention is a function of the geographic coordinates of a predetermined anchor point of zone, e.g. its centroid, its top left corner, and so forth.

[0047] Visibility Area

[0048] The visibility area is that portion of the downloaded map tiles that are displayed on the user client. Referring again to **FIGS. 6 and 7** in combination with the client as described in **FIG. 2B**, we see an example of a visibility area **600**. In this embodiment two map tiles are sent to the client. The two map tiles sent are for zones **946** and **947**. However, the entire area covered by each of these map tiles is not to be displayed by the client. In this embodiment of the invention, the client is to display a circular region with a radius of $\frac{1}{4}$ mile **600** from the requested location, this is the visibility area.

[0049] In an embodiment of the present invention, the client determines the visibility area. In an alternate embodiment, the server provides information to the client about the visibility area. Refer to **FIG. 2B** and the example of a generic user agent in the form of a web browser. In this embodiment, there are two other images that are being displayed in the browser. The first shows a banner ad **280** and the second shows a text box with information about the requested location **290**. The map server in this embodiment will send these images along with the proper javascript code

to the web browser to display these images in the proper location. These images and code are sent by the map server to the browser along with the required map tiles. However, as previously mentioned for this embodiment, the entire area covered by the provided map tiles is not to be displayed. In this embodiment, additional code will be sent to the client agent to aid in the display of the proper visibility area. In particular, with this embodiment, the server will send information on what portion of the map tiles will be displayed to the user. This will allow the client to render the proper visibility area.

[0050] Maps of Immediately Adjacent Zones

[0051] Referring back to **FIG. 5**, assume that the answer to the question on sending the adjacent maps was answered in the affirmative **590**. After the map tile of the zone containing the requested location is sent to the client **580**, without an explicit request from the client, the map server determines which zones are immediately adjacent to the zone containing the requested location **592**. **FIG. 8** shows the central zone AAD of **FIG. 7** and additional zones immediately adjacent to the central zone. In the case of central zone AAD, these immediately adjacent zones are ZC, ZD, ZE, AAC, AAE, ABC, ABD, and ABE. In this embodiment, the server will be configured to send these map tiles to the client as soon as they are available **594**.

[0052] To see how the sending of adjacent zones can be used beneficially, consider the situation of **FIG. 9**, where the user has been provided with zone AAD **920** for the requested location **910**. The user may be interested in trying to find the nearest freeway. The user believes that the freeway of interest may be east of the default visibility area shown **930**. In this case, the user can pan in an easterly direction. Assume that the user pans and the new area required is that shown in **940**. As shown in **FIG. 9**, area **950** would be required but not available. As discussed above, if the immediately adjacent map tiles are available, a request to pan east will not result in a request of additional data.

[0053] When the set of map tiles of immediately adjacent zones along with the map tile for the central zone have been sent to, and received by, the client, the client has received a first inner area.

[0054] Second Layer of Adjacent Maps

[0055] Ideally, to minimize requests for additional data, it would be desirable to send the entire area, serviced by the map server, to the client. However, this is not practical as the storage area on the client would not likely be able to accommodate this amount of data. Additionally, the time required to transfer this data would provide little value to the user. Nevertheless, it would appear that, depending on the configuration of the client with respect to the details of each map, there may frequently be a desire to have more than a first inner area sent to the client.

[0056] Referring to **FIG. 11**, we see a portion of an area serviced by a map server. Assume that the location represented at **1150** is a requested location to a map server. In the embodiments discussed, the central map tile of zone **42773** would be sent to the client. Additionally, the map tiles of the immediately adjacent zones would be sent to the client. In this example, this would be zone numbers **32762**, **32763**, **32764**, **42772**, **42774**, **52782**, **52783**, and **52784**. In different

embodiments, these map tiles may be sent either with the map tile of the central zone or separately from the map of the central zone.

[0057] It is desirable in certain cases to have sent to the client, upon an initial request for a map from the map server, a wider area than that of the first inner area. In an embodiment, the server will send, in addition to the first inner area, those maps adjacent to the maps of the first inner area that have not already been sent to the client. For example in **FIG. 11**, as discussed above, a request for a first inner area will result in the maps of nine zones being sent to the client. In this embodiment, 16 other zones surrounding the first inner area will be sent to the client. These zones are **22751-22755**, **32761**, **32765**, **42771**, **42775**, **52781**, **52785**, and **62791-62795**. These zones, combined with the first inner area constitute a second inner area. The sending of the second inner area will result in less of a likelihood of generating a request for additional data when panning. This procedure can be used to send a discrete, but flexible area surrounding the requested location.

[0058] Advantages Over Prior Art

[0059] As mentioned previously in the detailed description, a chief advantage of the current invention over the prior art is the static existence of the map tiles. In the prior art when a user attempts to pan in any direction, the server will dynamically generate the maps. This generation of maps has several disadvantages as previously discussed.

[0060] Another aspect of having maps generated real-time is that they are custom maps. These maps are generated and served up in a response to a very specific request. In contrast, the map tiles that are provided by the present invention are static map tiles that would be served to any client requesting a location in the zone covered by that map tile. As a result, there are circumstances where a likelihood exists that the map tiles would be requested with such frequency that they would be cached by a server nearer to the requesting client than the map server. If a user requests a map tile from one of these servers with the cached map tile, the service of a map tile from one of these caching servers would result in a reduction of the time required to get the correct map tile to the client.

[0061] As an example of this feature refer to **FIGS. 10 and 11**. **FIG. 10** shows an embodiment where the clients **1010** and **1015** are running local user agents and map server **1050** is serving up maps through the Internet. **FIG. 11** shows a portion of an area serviced by a map server. This figure shows two locations of interest. The first location **1110** is an identifier of a location for which client **1010** is interested in obtaining a map. The second location **1115** is an identifier of a location for which client **1015** is interested in obtaining a map. In this embodiment, in addition to the central map tiles being sent to each client, immediately adjacent map tiles will also be sent. Resultantly, zone **32761** will be sent to client **1010** along with immediately adjacent maps **22750**, **22751**, **22752**, **32760**, **32762**, **42770**, **42771**, and **42772**. Additionally, map tile **32765** will be sent to client **1015** with immediately adjacent maps **22754**, **22755**, **77756**, **32764**, **32766**, **42774**, **42775**, and **42777**. For the purpose of this part of the description, we will assume the earlier described embodiment, where the identifications of the adjacent map tiles may be inferred from the naming convention. Since client **1010** has requested a map for location **1110**, a first

inner area is sent to the client, including maps of zones **22750-22752**, **32760-32762** and **42770-42772**. Assume that the user has decided to pan east (to the right as shown in **FIG. 11**) such that a request for additional data occurs when the client attempts to pan to an area in zone **32763**. Since identification of the individual map tiles may be inferred from the naming convention, the client in possession of a map tile of zone **32762** will know the identification for the map tile immediately to its east is **32763**. Resultantly the client **1010** will send a request to the map server for map **32763**. However, this map tile was sent to client **1015** when it requested the map tiles of the first inner area for requested location **1115**. There is a likelihood that the proxy server **1020** will have cached the requested files that were sent to client **1015**. Proxy server caching is well known in the art and will not be described further. As a result of the caching, the required files containing the map tile for zone **32763** are present at the proxy and are sent to client **1015**. This extinguishes the need for the request to travel to the map server **1050**. This can greatly improve the response time of panning during the process of viewing the map tiles.

[0062] Thus, a method and apparatus for distributing and displaying maps electronically has been described. Those skilled in the art will appreciate that the present invention is not limited to the embodiments described. For example, consistent with the spirit and scope of the present invention, set forth by the claims below, the present invention may be modified to confer the benefits of the present invention to zooming and other like kinds of operations. Thus, the description is to be regarded as illustrative and not restrictive.

What is claimed is:

1. A method comprising:

receiving a requested location;

selecting, based on the requested location, a first pre-existing map tile that contains a representation of an area that comprises the requested location, from a plurality of preexisting map tiles; and

sending the selected first map tile.

2. The method of claim 1 further comprising

selecting a first set of adjacent map tiles, the first set of adjacent map tiles containing representations of areas immediately adjacent to the area represented by the first map tile, from the plurality of preexisting map tiles.

sending the first set of adjacent map tiles.

3. The method of claim 2 further comprising

selecting a second set of adjacent map tiles, the second set of adjacent map tiles containing representations of areas immediately adjacent to the area represented by the first set of adjacent map tiles, from the plurality of preexisting map tiles.

sending the second set of adjacent map tiles.

4. The method of claim 2 wherein the requested location comprises a street address.

5. The method of claim 2 wherein the requested location comprises a longitude and a latitude.

6. The method of claim 2 wherein the set of adjacent map tiles comprises:

a graphical image of the zone represented by each one of the map tiles in the set of first adjacent map tiles.

7. The method of claim 2 further comprising sending information describing a visible area to be displayed, the visible area comprising a part of a combined area represented by the set of first adjacent map tiles and the selected first map tile.

8. A method comprising:

receiving a set of one or more preexisting map tiles, from a server, for display, each map tile in the set of one or more preexisting map tiles comprising at least one graphical image and a set of identifiers of preexisting map tiles immediately adjacent to the map tile, the graphical image represents an area comprising a requested location; and

displaying the set of one or more preexisting map tiles to a user.

9. The method of claim 8 further comprising:

receiving, from a user, a request to move in a direction relative to the displayed set of one or more preexisting map tiles; and

determining, from the received requested direction and the set of identifiers of preexisting maps, the identifiers of the preexisting map tiles required to be displayed to reflect the requested move.

10. The method of claim 9 further comprising sending a request for the map tiles required to be displayed to reflect the requested move.

11. An apparatus comprising:

storage medium having stored therein a plurality of executable instructions, wherein

when executed, the instructions operate the apparatus to receive a requested location,

select, based on the requested location, a first preexisting map tile that contains a representation of an area that comprises the requested location, from a plurality of preexisting map tiles, and

send the selected first map tile; and

at least one processor coupled to the storage medium to execute the instructions.

12. The apparatus of claim 11, wherein the executing instruction operate the apparatus to

select a first set of adjacent map tiles, the first set of adjacent map tiles containing representations of areas immediately adjacent to the area represented by the first map tile, from the plurality of preexisting map tiles.

send the first set of adjacent map tiles.

13. An apparatus comprising:

storage medium having stored therein a plurality of executable instructions, wherein

when executed, the instructions operate the apparatus to

receive a set of one or more preexisting map tiles, from a server, for display, each map tile in the set of one or more preexisting map tiles comprising at least one graphical image and a set of identifiers of preexisting map tiles immediately adjacent to the map tile, the graphical image represents an area comprising a requested location, and

display the set of one or more preexisting map tiles to a user; and

at least one processor coupled to the storage medium to execute the instructions.

14. The apparatus of claim 13, wherein the executing instruction operate the apparatus to

receive, from a user, a request to move in a direction relative to the displayed set of one or more preexisting map tiles; and

determine, from the received requested direction and the set of identifiers of preexisting maps, the identifiers of the preexisting map tiles required to be displayed to reflect the requested move.

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